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Indian Standard
SPECIFICATION FOR CORN FLAKES
(First Revision)

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NEW DELHI 110002

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SPECIFICATION FOR CORN FLAKES
(First Revision)

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AMENDMENT NO. 3 OCTOBER 1998
TO
IS 1158 : 1973 SPECIFICATION FOR CORN FLAKES

(First Revision)

(*Page* 6, *clause* A-1) — Insert the following new clause:

'**A-1.1 Preparation of Sample** —Grind in a pestle and mortar about 50 g of the material so that at least 90 percent passes through 425-micron IS Sieve. Transfer this prepared sample to a well-stoppered glass bottle for subsequent use.'

(*Page* 6, *clause* A-1.1) — Renumber as A-1.2. Delete first sentence.

(*Page* 7, *clause* B-2.1) — Delete.

(*Page* 7, *clauses* B-2.2, B-2.2.1 *and* B-2.2.2) — Renumber as B-2.1, B-2.1.1, and B-2.1.2.

(*Page* 7, *clauses* B-2.1 *and* B-3.1 *and page* 8, *clause* B-3.2) — Substitute '(*see* A-1.2)' *for* '(*see* B-2.1)'.

(*Page* 9, *clause* D-2.1) — Substitute '(*see* A-1.1)' *for* '(*see* B-2.1)'.

(FAD 16)

Reprography Unit, BIS, New Delhi, India

Indian Standard

SPECIFICATION FOR CORN FLAKES

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 31 January 1973, after the draft finalized by the Foodgrains, Foodgrains Products and Edible Oilseed Flours Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 This standard was first issued in 1957. Since then, several problems, such as, increase of moisture during storage and breakage during transport have arisen. On the basis of extensive investigations, this revision incorporates the latest thinking of the Committee responsible for the preparation of this standard on these issues.

0.3 In the the preparation of this Indian Standard, due consideration has been given to provisions stipulated under the Prevention of Food Adulteration Act, 1954 and Rules framed thereunder. However, this standard is subject to the restrictions imposed under the Rules, where-ever applicable.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for corn flakes.

---

*Rules for rounding off numerical values (*revised*).

2. REQUIREMENTS

2.1 General — Corn flakes shall be prepared from cleaned, sound corn (*Zea mays*). The corn shall be scoured, degermed, dehulled and polished, and then cooked after mixing with malt, sugar and salt, followed by flaking, partial drying and finally to toasting.

2.2 Description — Corn flakes shall be tender and crisp, reasonably uniform in size, of good flavour and golden brown in colour. Corn flakes shall possess good characteristic taste and odour and shall be free from rancid, musty, sour and other undesirable tastes or odours. The flakes shall be free from living insects and moulds and shall be free from dead insects, insect fragments and rodent contamination visible to the eye (corrected, if necessary for abnormal vision) with the aid of a suitable magnification (not exceeding × 10).

NOTE — The appearance, taste and odour shall be determined by sensory evaluation tests.

2.2.1 Not more than 8 percent by mass of the material shall pass through 2·00-mm IS Sieve (*see* IS : 460-1962*).

2.3 Enrichments — Corn flakes may be enriched by the addition of vitamins and minerals.

2.4 Corn flakes shall also conform to the requirements given in Table 1.

TABLE 1 REQUIREMENTS FOR CORN FLAKES

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST (REF TO APPENDIX)
(1)	(2)	(3)	(4)
i)	Moisture, percent by mass, *Max*	7·5	A
ii)	Total ash, excluding sodium chloride (on dry basis), percent by mass, *Max*	1·0	B
iii)	Acid insoluble ash (on dry basis), percent by mass, *Max*	0·05	C
iv)	Crude fibre (on dry basis), percent by mass, *Max*	0·75	D
v)	Alcoholic acidity (as H_2SO_4) with 90 percent alcohol, percent by mass, *Max*	0·10	E

---

*Specification for test sieves (*revised*).

3. PACKING AND MARKING

3.1 Packing — Corn flakes shall be packed in high density polyethylene bags alone or first packed in high density polyethylene bags, properly sealed and then placed in cardboard cartons. The packages shall be of such sizes as agreed to between the purchaser and the vendor.

3.1.1 The bags used for packing corn flakes shall be made of 300 gauge high density polyethylene of thickness 0·075 mm.

3.2 Marking — Each container shall be suitably marked so as to give the following information:

a) Name of the material;
b) If enriched with vitamins (1) the word 'vitaminized' placed in brackets, below (a), and (2) the details of enrichment;
c) Name of the manufacturer;
d) Batch or code number; and
e) Net weight.

3.2.1 Each container may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to the standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

4. SAMPLING

4.1 Representative samples of the material for testing conformity to this standard shall be drawn according to the method prescribed in Appendix F.

5. TESTS

5.1 Tests shall be carried out as prescribed under **2.2**, the appropriate appendices specified in col 4 of Table 1 and in **3.1**.

5.2 Quality of Reagents — Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (*see* IS : 1070-1960*) shall be used where the use of water as a reagent is intended.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the result of analysis.

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*Specification for water, distilled quality (*revised*).

APPENDIX A

[*Table* 1, *Item* (i)]

DETERMINATION OF MOISTURE

A-1. PROCEDURE

A-1.1 Grind in a pestle and mortar about 50 g of the material so that at least 90 percent passes through 425-micron IS Sieve. Weigh accurately about 5 g of the prepared sample in a suitable moisture dish, made of porcelain, silica or platinum, previously dried in an electric oven and weighed. Place the dish in an electric oven maintained at 105 ± 1°C for 5 hours. Cool the dish in a desiccator and weigh with the lid on. Repeat the process of heating, cooling and weighing at half-hour intervals until the loss in mass between two successive weighings is less than one milligram. Record the lowest mass obtained.

A-2. CALCULATION

A-2.1 Moisture, percent by mass $= \dfrac{100\,(M_1 - M_2)}{M_1 - M}$

where

M_1 = mass in g of the dish with the material before drying,
M_2 = mass in g of the dish with the material after drying, and
M = mass in g of the empty dish.

APPENDIX B

[*Table* 1, *Item* (ii)]

DETERMINATION OF TOTAL ASH, EXCLUDING SODIUM CHLORIDE

B-1. REAGENTS

B-1.1 Standard Silver Nitrate Solution — 0·1 N.

B-1.2 Ammonium Thiocyanate Solution — Standardized against 0·1 N silver nitrate solution.

B-1.3 Dilute Nitric Acid Solution — 1 : 9. To 900 ml of water, add 100 ml of concentrated nitric acid (sp gr 1·42) and stir.

B-1.4 Concentrated Nitric Acid Solution — 4 : 1. To 100 ml of water, add 400 ml of concentrated nitric acid (sp gr 1·42). **Bring** the contents to boiling until colourless solution is obtained.

B-1.5 Ferric Alum Indicator Solution — Prepare a saturated solution of ferric alum in water and filter.

B-2. PROCEDURE

B-2.1 Preparation of Sample — Grind in a pestle and mortar about 50 g of the material so that at least 90 percent passes through 425-micron IS Sieve. Transfer this prepared sample to a well-stoppered glass bottle for subsequent use.

B-2.2 Ignite the dried material (*see* **B-2.1**) in the dish over a Meker burner for about 1 hour. Complete the ignition by keeping in a muffle furnace at 600 ± 20°C until grey ash results. Cool in a desiccator and weigh. Heat and dish again in the muffle furnace at 600 ± 20°C for 30 minutes and cool in the desiccator. Repeat this process of heating, cooling and weighing until the difference between two successive weighings is less than one milligram. Note the lowest mass.

B-2.2.1 Dissolve the ash in 25 ml of the dilute nitric acid solution (1:9). Filter through Whatman filter paper No. 1 or its equivalent, collecting the filtrate in a 100-ml graduated flask, and wash the contents thoroughly with hot water. Make the volume to 100 ml.

B-2.2.2 To a 25-ml aliquot of the filtrate, add excess of the standard silver nitrate solution (20 ml), stirring well to flocculate the precipitate of silver chloride. Filter and wash the precipitate thoroughly with water. To the combined filtrate, add 5 ml of each of the ferric alum indicator solution and concentrated nitric acid solution (4 : 1). Titrate the excess of silver nitrate with the standard ammonium thiocyanate solution to a stable light brown colour end point.

B-3. CALCULATION

B-3.1 Total ash (on dry basis), percent by mass

$$= \frac{100\,(M_2 - M)}{M_1 - M}$$

where

M_2 = mass in g of the dish with the ash,

M = mass in g of the empty dish, and

M_1 = mass in g of the dish with the dried material (*see* **B-2.1**).

B-3.2 Sodium chloride (on dry basis), percent by mass $= \frac{5.85\,(V_1N_1 - V_2N_2)}{M_1 - M} \times \frac{V_3}{V_4}$

where

V_1 = volume in ml of the standard silver nitrate solution added initially,
N_1 = normality of the silver nitrate solution,
V_2 = volume in ml of the standard ammonium thiocyanate solution required for titrating the excess of silver nitrate,
N_2 = normality of the standard ammonium thiocyanate solution added,
M_1 = mass in g of the dish with the dried material (*see* **B-2.1**),
M = mass in g of the empty dish,
V_3 = volume in ml to which the filtrate was made up, and
V_4 = volume in ml of the aliquot of the filtrate taken for the experiment.

B-3.3 To obtain total ash, excluding sodium chloride (on dry basis), percent by mass, deduct the value obtained under **B-3.2** from that obtained under **B-3.1**.

APPENDIX C

[*Table* 1, *Item* (iii)]

DETERMINATION OF ACID INSOLUBLE ASH

C-1. REAGENTS

C-1.1 Dilute Hydrochloric Acid — approximately 5 N, prepared from concentrated hydrochloric acid (*see* IS : 265-1962*).

C-2. PROCEDURE

C-2.1 Weigh accurately about 5 g of the prepared sample in a suitable dish made of porcelain, silica or platinum previously dried in an electric oven and weighed. Ignite the material over a Meker burner for about 1 hour. Complete the ignition by keeping in a muffle furnace at 600 ± 20°C until grey ash results. Cool in a desiccator and weigh. Heat again in the muffle furnace at 600 ± 20°C for half an hour and cool in the desiccator and weigh. Repeat this process of heating, for 30 minutes, cooling and weighing till the difference in weight between two successive weighings is less than one milligram.

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*Specification for hydrochloric acid (*revised*).

C-2.2 To the ash contained in the dish, add 25 ml of dilute hydrochloric acid, cover with a watch glass and heat on a water-bath for 10 minutes. Allow to cool and filter the contents of the dish through Whatman filter paper No. 42 or its equivalent. Wash the filter paper with water till the washings are free from the acid and return it to the dish. Keep it in an electric air-oven maintained at 135 ± 2°C for about 3 hours. Ignite in a muffle furnace at 600 ± 20°C for 1 hour. Cool the dish in a desiccator and weigh. Repeat the process of igniting in the muffle furnace, cooling and weighing at half-hour intervals till the difference in mass between two successive weighings is less than one milligram. Note the lowest mass.

C-3. CALCULATION

C-3.1 Acid insoluble ash (on dry basis), percent by mass

$$= \frac{10\,000\,(M_2 - M)}{(M_1 - M)\,(100 - m)}$$

where

M_2 = mass in g of the dish with the acid insoluble ash,

M = mass in g of the empty dish,

M_1 = mass in g of the dish with the material, and

m = the percentage of moisture as determined in Appendix A.

APPENDIX D

[*Table* 1, *Item* (iv)]

DETERMINATION OF CRUDE FIBRE

D-1. REAGENTS

D-1.0 The following reagents are required.

D-1.1 Dilute Sulphuric Acid — 1·25 percent (*m/v*), accurately prepared.

D-1.2 Sodium Hydroxide Solution — 1·25 percent (*m/v*), accurately prepared.

D-1.3 Ethyl Alcohol — 95 percent by (*v/v*).

D-2. PROCEDURE

D-2.1 Dry to constant mass, about 5 g of the prepared sample (*see* **B-2.1**) in an electric air-oven at 105 ± 1°C. Weigh accurately about 2·5 g of the dried material into a thimble and extract for about 1 hour with petroleum ether using a Soxhlet apparatus. Transfer the fat-free material to 1-litre flask. Take 200 ml of dilute sulphuric acid in a beaker and bring to boil. Transfer the whole of the boiling acid to the flask containing the fat-free material and immediately connect the flask with a water-cooled reflux condenser and heat, so that the contents of the flask begin to boil within 1 minute. Rotate the flask frequently, taking care to keep the material from remaining on the sides of the flask out of contact with the acid. Continue boiling for exactly 30 minutes. Remove the flask and filter through fine linen (about 18 threads to the centimetre) held in a funnel, and wash with boiling water until the washings are no longer acid to litmus. Bring some quantity of sodium hydroxide solution to boiling under reflux condenser. Wash the residue on the linen into the flask with 200 ml of the boiling sodium hydroxide solution. Immediately connect the flask with the reflux condenser and boil for exactly 30 minutes. Remove the flask and immediately filter through the filtering cloth. Thoroughly wash the residue with boiling water and transfer to a Gooch crucible prepared with a thin but compact layer of ignited asbestos. Wash the residue thoroughly, first with hot water and then with about 15 ml of ethyl alcohol. Dry the Gooch crucible and contents of 105 ± 1°C in an air-oven to constant mass. Cool and weigh. Incinerate the contents of the Gooch crucible in an electric muffle furnace at 600 ± 20°C until all the carbonaceous matter is burnt. Cool the Gooch crucible containing the ash in a desiccator and weigh.

D-3. CALCULATION

D-3.1 Crude fibre (on dry basis), percent by mass

$$= \frac{100\,(M_1 - M_2)}{M}$$

where

M_1 = mass in g of Gooch crucible and contents before ashing,

M_2 = mass in g of Gooch crucible containing asbestos and ash, and

M = mass in g of the dried material taken for the test.

APPENDIX E

[*Table* 1, *Item* (v)]

DETERMINATION OF ALCOHOLIC ACIDITY

E-1. REAGENTS

E-1.1 Neutral Ethyl Alcohol — 90 percent by volume.

E-1.2 Standard Sodium Hydroxide Solution — approximately 0·05 N.

E-1.3 Phenolphthalein Indicator Solution — Dissolve 0·1 g of phenolphthalein in 100 ml of 6·0 percent (*v/v*) rectified spirit.

E-2. PROCEDURE

E-2.1 Weigh 5 g of sample into a conical glass-stoppered flask and add 50 ml of neutral ethyl alcohol. Stopper, shake and allow to stand for 24 hours, with occasional shaking. Filter the alcoholic extract, through a dry filter paper. Titrate 10 ml of the combined alcoholic extract against standard sodium hydroxide solution using phenolphthalein as indicator. Calculate the percentage of alcoholic acidity as sulphuric acid.

E-3. CALCULATION

E-3.1 Alcoholic acidity (as H_2SO_4), with 90 percent alcohol, percent by mass $= \frac{24\cdot52\ VN}{M}$

where

V = volume in ml of standard sodium hydroxide solution used in titration,

N = normality of standard sodium hydroxide solution, and

M = mass in g of the material taken for the test.

APPENDIX F

(*Clause* 4.1)

SAMPLING OF CORN FLAKES

F-1. GENERAL REQUIREMENTS OF SAMPLING

F-1.0 In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

F-1.1 Samples shall taken in a protected place not exposed to dam air, dust or soot.

F-1.2 The sampling instrument shall be clean and dry when used.

F-1.3 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

F-1.4 The samples shall be placed in clean, odourless and dry glass containers. The sample containers shall be of such a size that they are almost completely filled by the sample.

F-1.5 Each container shall be sealed air-tight after filling and marked with full details of sampling, batch or code number, name of the manufacturer and other important particulars of the consignment.

F-1.6 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

F-1.7 Sampling shall be done by a person agreed to between the purchaser and the vendor, and in the presence of the purchaser (or his representative) and the vendor (or his representative).

F-2. SCALE OF SAMPLING

F-2.1 Lot — All the containers in a consignment belonging to the same batch of manufacture shall constitute a lot.

F-2.1.1 Samples shall be tested from each lot for ascertaining conformity of the material to the requirements of the specification.

F-2.2 The number of containers to be tested from a lot shall depend on the size of the lot and shall be in accordance with Table 2.

TABLE 2 NUMBER OF CONTAINERS TO BE SELECTED FOR SAMPLING

TOTAL NUMBER OF CONTAINERS IN THE LOT *N* (1)	NUMBER OF CONTAINERS TO BE SELECTED *n* (2)
1 or 2	All containers
3 to 15	3
16 ,, 40	5
41 ,, 110	8
111 ,, 300	13
301 ,, 800	22
Above 800	32

F-2.3 The containers to be selected for sampling shall be chosen at random from the lot and, for this purpose, random number tables (*see also* IS : 4905-1968*) shall be used. In case such tables are not available, the following procedure may be adopted:

> Starting from any container, count them as 1, 2, 3.......... up to *r* and so on, in a systematic manner. Every *r*th container thus counted shall be chosen, *r* being the integral part of *N*/*n* (*see* Table 2).

F-3. TEST SAMPLES AND REFEREE SAMPLES

F-3.1 Preparation of Individual Samples — Empty out the contents of the container on a sheet of paper and mix thoroughly. Cone and quarter as often as necessary till about 150 g of the material is left. From this take about 75 g of the material and divide it into three equal parts. Each part so obtained shall constitute an individual sample representing the container and shall be transferred immediately to thoroughly clean and dry containers, sealed air-tight and labelled with particulars given in **F-1.5**. The individual samples so obtained shall be divided into three sets in such a way that each set has a sample representing each selected container. One of these sets shall be marked for the purchaser, the other for the vendor and the third for the referee.

---

*Methods for random sampling.

F-3.2 Preparation of a Composite Sample — From the material from each selected container remaining after the individual sample has been taken, equal quantities of the material shall be taken and mixed together so as to form a composite sample weighing not less than 150 g. This composite sample shall be divided into three equal parts and transferred to clean and dry glass containers and labelled with the particulars given in **F-1.5**. One of these composite samples shall be marked for the purchaser, the other for the vendor and the third for the referee.

F-3.3 Referee Samples — Referee samples shall consist of a set of individual samples (*see* **F-3.1**) and a composite sample (*see* **F-3.2**) marked for this purpose and shall bear the seals of the purchaser and the vendor. These shall be kept at a place agreed to between the two.

F-4. NUMBER OF TESTS

F-4.1 Tests for requirements given in **2.2** shall be conducted on each of the samples constituting a set of individual test samples (*see* **F-3.1**).

F-4.2 Tests for moisture, total ash, acid insoluble ash, crude fibre and alcoholic acidity, shall be conducted on the composite sample (*see* **F-3.2**).

F-5. CRITERIA FOR CONFORMITY

F-5.1 The lot shall be considered satisfactory in respect of the requirements of **F-4.1**, if each individual sample satisfies all the requirements.

F-5.2 The lot shall be considered satisfactory in respect of the requirements of **F-4.2**, if the test results on the composite sample satisfy the corresponding requirements.

F-5.3 The lot shall be declared to be in conformity with all the requirements of this specification, if it has been found satisfactory in accordance with **F-5.1** and **F-5.2**.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	$1\ \mathrm{N} = 1\ \mathrm{kg.m/s^2}$
Energy	joule	J	$1\ \mathrm{J} = 1\ \mathrm{N.m}$
Power	watt	W	$1\ \mathrm{W} = 1\ \mathrm{J/s}$
Flux	weber	Wb	$1\ \mathrm{Wb} = 1\ \mathrm{V.s}$
Flux density	tesla	T	$1\ \mathrm{T} = 1\ \mathrm{Wb/m^2}$
Frequency	hertz	Hz	$1\ \mathrm{Hz} = 1\ \mathrm{c/s}\ (\mathrm{s^{-1}})$
Electric conductance	siemens	S	$1\ \mathrm{S} = 1\ \mathrm{A/V}$
Electromotive force	volt	V	$1\ \mathrm{V} = 1\ \mathrm{W/A}$
Pressure, stress	pascal	Pa	$1\ \mathrm{Pa} = 1\ \mathrm{N/m^2}$

INDIAN STANDARDS INSTITUTION

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117/418 B Sarvodaya Nagar	KANPUR 208005	4 72 92
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